CHAPTER 2. PRINCIPLES FOR TRADING

The fundamental principle of trading within the Clean Water Act framework is that water quality standards must be met and technology-based requirements must remain in place.

Trading and the Clean Water Act

Proper design of a trading approach is essential for attaining environmental objectives. The applicability and usefulness of trading depend on water quality problems in a given area. Similarly, the benefits of trading tend to be site-specific in nature. For these reasons, trading is a tool that is most effective when well designed and administered when and where appropriate.

This chapter discusses ways in which trading can work. It is divided into two major sections: the first provides a brief overview; and the second discusses eight principles for trading. This chapter identifies statutory and regulatory requirements, analytical and planning constructs, and design and implementation considerations for effective trading.

Overview of Water Quality Rules and Management in the United States

The CWA is the backbone of water quality management in the United States. The act*s provisions and implementing regulations create a system to protect water quality and environmental health. A number of CWA provisions affect how trading can occur, including, water quality standards, effluent guidelines, and total maximum daily loads (TMDLs).

Water Quality Standards

Water quality standards consist of designated uses, numeric and narrative criteria, and antidegradation implementation policies.

Designated Uses. States designate uses (e.g., recreational contact, fishing, industrial discharge) for each body of water and establish water quality standards that protect, restore, and maintain designated uses.

Criteria. Water quality criteria, which describe the specific water quality conditions that will achieve designated uses, can be expressed in chemical, physical, or biological terms. Examples include: 10 mg/l BOD; 29E Celsius, indices of biological integrity, or narrative statements such as "no discharge of toxics in toxic amounts."

Anti-Degradation Policy. The anti-degradation policy specifies that all existing uses of a waterbody must be maintained, whether or not they are designated uses. If the water is cleaner than necessary to support fishable/swimmable uses, that water quality must be maintained unless important economic and social goals dictate otherwise. A three-tiered anti-degradation policy is part of each state*s water quality standards:

- Tier 1: Maintain existing beneficial uses of surface waters and prevent degradation that could interfere with those uses.
- Tier 2: Protect water quality in "fishable/swimmable" waters (i.e.,

bodies of water in which water quality meets or exceeds the levels necessary to support (1) the propagation of fish, shellfish and wildlife and (2) recreation on and in the water).

- Tier 3: Provide special protection for "Outstanding Natural Resource Waters," such as waters of national or state parks, wildlife refuges, or other waters of exceptional recreational or ecological significance.

Effluent Guidelines, Categorical Pretreatment Standards, and Local Limits

To achieve water quality standards, governmental authorities typically rely on effluent guidelines, categorical pretreatment standards, and local limits for point sources and indirect dischargers, respectively.

A point source is any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, or vessel or other floating craft from which pollutants are or may be discharged.

The term "point source" includes stormwater discharges from municipal separate storm sewers generally serving communities with populations of greater than 100,000 and stormwater discharges associated with industrial activities, but does not include return flows from irrigated agriculture or agricultural stormwater runoff. Publicly owned treatment works (POTWs) are an example of a point source.

Indirect dischargers are industrial or commercial dischargers that discharge pollutants to a POTW. Many POTWs receive effluent from industrial and commercial sources that is indirectly discharged to waterbodies through the POTWs.

POTWs, other direct dischargers, and indirect industrial dischargers must meet national minimum technology-based effluent limits that EPA sets independent of receiving water quality.

Direct Dischargers. EPA has issued technology-based requirements for 51 categories of direct industrial dischargers, most of which are divided into subcategories. These "effluent guidelines" are based on assessments of the greatest degree of pollution control applicable technology can achieve that is economically achievable for the industry. In the case of POTWs, the national baseline is called "secondary treatment."

Point source dischargers are subject to a permitting system known as the National Pollutant Discharge Elimination System (NPDES). They receive NPDES permits from a permitting authority that reflect applicable technology-based requirements and any more stringent water quality-based effluent limits, along with monitoring and other requirements.

When technology-based requirements are not stringent enough for receiving waters to meet water quality standards, permitting authorities develop more stringent "water quality-based" effluent limits (WQBELs) that will result in the attainment of water quality standards. WQBELs are incorporated into point sources* NPDES permits. The process of establishing these limits varies across states and EPA Regions.

Indirect Dischargers. Pretreatment standards include specific pollutant discharge standards for 39 industrial categories, pollution discharge prohibitions for all indirect dischargers, and local discharge limits developed by POTWs for their systems. The national baselines for indirect industrial dischargers are called "categorical pretreatment standards." All indirect dischargers must comply with general prohibitions that address discharges that can cause pass through and/or interference, as well as specific prohibitions that address fire and explosive hazards in treatment works. Indirect dischargers are regulated by the POTW and do not require an NPDES permit themselves; they are required to meet applicable limits in accordance with pretreatment standards.

POTWs may develop requirements for indirect dischargers to supplement categorical pretreatment standards called "local limits." Local limits help POTWs ensure that they remain in compliance with their NPDES permits, as well as preventing indirect dischargers' wastestreams from interfering with plant operations or passing through POTWs untreated.

Diffuse Sources

The CWA does not regulate diffuse, or "nonpoint," sources through a federal permit program. Instead, it provides grants for states to establish plans for reducing pollution from nonpoint sources. Nonpoint source management plans must adhere to all applicable state and local regulations and policies.

Section 6217 of The Coastal Zone Act Reauthorization Amendments (CZARA) requires coastal states to provide for the implementation of nonpoint source management measures for land uses and critical coastal areas adjacent to impaired or threatened coastal waters. A variety of state laws and local ordinances also contain provisions that specify best management practices (BMPs) to control pollutants from nonpoint sources.

Total Maximum Daily Loads (TMDLs)

A TMDL is an analysis used to calculate the maximum pollutant load a waterbody can receive (loading capacity) without violating water quality standards. States are required to establish TMDLs for waterbodies where technology-based requirements alone are insufficient to attain water quality standards.

A TMDL includes allocations of pollutant loads among sources: wasteload allocations (WLAs) for point sources, load allocations (LAs) for nonpoint sources, background loadings from natural sources, and margins of safety to ensure achievement of water quality goals. The CWA requires that EPA review and approve TMDLs.

Anti-Backsliding Requirements

The anti-backsliding requirement of CWA section 402(o) generally prohibits reissuing a permit with a technology-based effluent limit that is less stringent than the existing technology-based limit. With respect to water quality-based effluent limits (WQBELs) the anti-backsliding clause in CWA section 303(d)(4) specifies that backsliding from a WQBEL can occur in only two situations:

1. Where a waterbody is not attaining its water quality standard, a limit may be relaxed only if a TMDL or WLA has been performed establishing a new limit and implementation of that

TMDL/WLA will ensure compliance with water quality standards.

2. Where a waterbody is attaining its water quality standards, a limit may be relaxed only if the requirements of the anti-degradation policy are being met.

Effluent Trading Principles to Meet Water Quality Objectives

To work within the framework of laws, regulations, and policies for attaining water quality in the United States, trading should follow eight principles:

3. Trading participants meet applicable CWA technology-based requirements.

4. Trades are consistent with water quality standards throughout a watershed, as well as anti-backsliding, other requirements of the CWA, other federal laws, state laws, and local ordinances;.

3. Trades are developed within a TMDL process or other equivalent analytical and management framework.

4. Trades occur in the context of current regulatory and enforcement mechanisms.

5. Trading boundaries generally coincide with watershed or waterbody segment boundaries, and trading areas are of a manageable size.

6 Trading will generally add to existing ambient monitoring.

7. Careful consideration is given to the types of pollutants traded.

8. Stakeholder involvement and public participation are key components of trading.

These principles are discussed in greater detail below.

Principle 1: Trading participants meet applicable CWA technology-based requirements.

Technology-based requirements are minimum national effluent standards imposed on POTWs and industrial dischargers by NPDES permits. These technology-based requirements, as defined by sections 301(b)(1), 301(b)(2), 304(b), and 306 of the CWA, establish the discharge standards to be achieved by all POTWs and designated categories of industrial dischargers. All dischargers must install appropriate treatment to achieve these required levels.

Implications for Trading

Establishing the principle that *all* trading partners meet applicable technology-based requirements preserves minimum levels of water quality protection mandated by the CWA. It also promotes fairness by allowing only those sources which have already met a baseline contribution to water quality protection efforts to benefit from trading. The result of implementing this principle is that sources that meet technology-based requirements may trade to achieve any more stringent water quality-based requirements.

Since national minimum standards are expressed as limits on the amount of a pollutant that can be in the effluent a facility discharges, it is not possible to arrange for comparable pollution controls at another source. This is why all traders must first meet technology-based requirements.

Principle 2: Trades are consistent with water quality standards throughout a

watershed, as well as anti-backsliding, other requirements of the Clean Water Act, other federal laws, state laws, and local ordinances.

Water quality standards articulate water quality goals. Standards comprise designated uses, water quality criteria, and an anti-degradation policy. Control mechanisms used to meet the goals include TMDLs, WLAs, LAs, WQBELs, other NPDES permit provisions, BMPs, and other local ordinances related to water quality protection. Regulatory agencies vary control mechanisms as necessary to achieve water quality objectives.

Implications for Trading

Similar to applying Principle 1, applying Principle 2 ensures a certain level of water quality prior to implementation of a trading program and promotes fairness by allowing only those sources which meet baseline requirements to benefit from trading.

Specific implications of Principle 2 for trading include:

- Trades must not produce water quality effects that constrain designated uses for a waterbody.
- Traders or administrative authorities must be able to demonstrate that trades will ensure attainment of water quality standards throughout the watershed.
- No trader may discharge a higher level of pollutants than what is specified in permits or rules.
- Trading cannot result in a reissued permit that has less stringent limits than the original permit except, in the case of a water quality-based requirement, where the new limit is covered by a TMDL or is consistent with the anti-degradation policy.
- Traders must comply with assigned WLAs and LAs, although trading may help to develop those WLAs and LAs as part of a TMDL.
- Prior to trading, traders should comply with BMP requirements, if applicable.

To avoid double counting, pollutant reduction credits associated with federal requirements are not available for trading. For example, reduction credits from new or revised effluent guidelines or BMPs required by the Coastal Zone Act Reauthorization Amendments (CZARA) cannot be counted again in a trade.

Trades may not shift pollutant load reductions within a watershed in such a way that water quality standards are attained at the downstream end of the watershed while causing standards to be violated within an upstream portion of the watershed.

An agency reviewing a trade should ensure that the pollution reductions required of a source reflect a margin of safety that is proportional to the uncertainty associated with load reductions over large spatial scales and is adequate to ensure that the reductions will actually attain water quality standards throughout the trading area. Complex issues of flow, hydrology, pollutant degradation, and related matters should be evaluated over a potentially large watershed.

Regulators can incorporate Principle 2 in trading programs by modifying or revising existing control mechanisms such as TMDLs, WLAs, LAs, WQBELs, and other NPDES permit provisions in a way that

allows trading and is consistent with the CWA.

Principle 3: Trades are developed within a TMDL or other equivalent analytical and management framework.

Based on section 303(d) of the CWA, states establish TMDLs for waterbodies, or portions of waterbodies, where technology-based requirements alone are insufficient to attain water quality goals. TMDLs provide estimates of pollutant loadings from all sources, include a margin of safety, and predict resulting ambient pollutant concentrations. Data from a TMDL can be used to forecast how changes in various discharges will affect water quality.

Other analytical frameworks may be sufficient for trading purposes if they are approved by EPA. These analytical frameworks should also be able to determine the desired ambient condition, link pollutant contributions from sources to ambient conditions, and predict the effects of pollutant reductions from different sources on in-stream water quality. Examples of other appropriate frameworks include Lakewide Area Management Plans (LaMPs) and Remedial Action plans (RAPs), used in the Great Lakes.

In cases where a TMDL has already assigned load reductions, trades can occur in the context of a point source NPDES permit. With the permitting authority's approval, a permittee would arrange a trade with other sources of a pollutant.(See Principle 4.)

For pretreatment trading, the appropriate analytical framework is called the Maximum Allowable Headworks Loading (MAHL). A POTW determines the MAHL for specific pollutants, while preventing indirect dischargers' wastestreams from interfering with plant operations or passing through POTWs untreated. The POTW also determines the Maximum Allowable Industrial Loading (MAIL), which is the total daily mass that the POTW can accept from all permitted industrial users.

Implications for Trading

TMDLs and similar water quality management approaches provide a basis for successful trading for two reasons:

- TMDLs allocate pollution control responsibilities among covered dischargers using a process that can be easily adapted to incorporate trades.

- Data and analyses generated in TMDLs typically enable water quality managers to better understand and predict general effects of proposed trades.

The TMDL process establishes the baseline pollution reduction responsibilities necessary to achieve designated water quality standards. This provides a starting point to compare the costs of the baseline responsibilities necessary to achieve alternative allocations that also meet water quality goals. In this way, TMDLs facilitate identification of the economic and water quality benefits of various allocations of pollutant reduction responsibilities.

Trades can be incorporated into TMDLs in two ways. If sources are contemplating trading when a TMDL is being developed, final allocations can reflect traded loading reductions. This approach resembles a negotiated allocation process.

If sources begin considering trading after a TMDL is already in place, states may

revise allocations to reflect proposed changes in load reduction responsibilities, i.e., trades. Such revisions may involve reopening NPDES permits or otherwise defining responsibilities for specific dischargers. The cost to the permitting authority should thus be considered in any trading program. Revisions to TMDLs require EPA review.

When a TMDL assigns pollutant reduction responsibilities to a nonpoint source, there must be reasonable assurance that nonpoint source controls will be implemented. "Reasonable assurance" generally means that the proposed nonpoint source controls are (1) technically feasible, (2) specific to the pollutant of concern, (3) to be implemented according to a schedule and within a reasonable time period, and (4) supported by reliable delivery mechanisms and adequate funding. Examples of reasonable assurance include state regulations or local ordinances, performance bonds, memoranda of understanding, contracts, or similar agreements.

Principle 4: Trades occur in the context of current regulatory and enforcement mechanisms.

All point source dischargers, regardless of involvement in trading, must comply with the CWA. Regulatory authorities use enforcement procedures as a tool for ensuring compliance with NPDES permit requirements, which are derived to achieve water quality standards.

Many types of enforcement tools are available to water quality agencies. These tools can vary in intensity and breadth of application. Several examples are notice of violation or administrative order; civil action, including assessment of fines; assessment of criminal penalties, including substantial jail sentences; and revocation of discharge permit.

Water quality agencies cannot use these enforcement tools unless individual dischargers are subject to and aware of specific requirements. These requirements are defined in the water quality regulations rules and management mechanisms (e.g., Clean Water Act, NPDES permits, local ordinances) discussed at the beginning of this chapter.

For nonpoint sources, some state regulations and local ordinances establish guidelines for selected nonpoint sources that are similar to technology-based requirements. Typically, states and localities specify several BMPs for each nonpoint source category as minimum measures to protect water quality. Jurisdictions require nonpoint sources to select options that offer economical pollution control given the characteristics of the land and the environment. (Jurisdictions "recommend" BMPs when commitments are voluntary.)

Implications for Trading

Trading should not lessen accountability for achieving water quality objectives. Trades must rely on existing regulatory and enforcement mechanisms where appropriate. For example, all trades involving point source dischargers should be reflected in a revised or reissued NPDES permit for each point source. A trade implemented through a permit is not a basis for extending the compliance period that would otherwise apply to the point source under a non-trade permit. Point sources are to meet compliance schedules as they would if no trade had been approved.

EPA anticipates that parties to trades will need to work with federal, state, tribal, and/or local regulatory entities on a case-by-case basis to ensure an appropriate level of accountability and enforceability in a trading arrangement. These entities can help traders incorporate traded pollutant loading reduction responsibilities into current regulatory and enforcement mechanisms.

Principle 5: Trading boundaries generally coincide with watershed or waterbody segment boundaries, and trading areas are of a manageable size.

Most detailed analyses of waterbodies that provide baseline data for trading programs examine entire waterbodies or defined segments of waterbodies. EPA and state water quality agencies use various systems that assign waterbody identification numbers to specific hydrologic units. These units, often called segments, have been delineated based on hydrologic features, such as the presence of a dam, the confluence of two rivers, or gradations of salinity in an estuary. Division of waterbodies into segments helps define where selected discharges are most likely to affect the water quality. Ideally, these segments comprise all land and water within the confines of a drainage.

Implications for Trading

Matching geographic trading areas with appropriate hydrologic units helps ensure that trades meet and maintain water quality standards throughout a trading area and in downstream or contiguous areas. For pretreatment trading, the trading boundary coincides with the collection system for an individual treatment plant.

Trading can involve shifting some amount of pollutant loading reductions from one location to another. A new location could be 100 yards away, across a lake, or half a mile upstream. Thus, selecting trading zone boundaries entails delineating the watersheds or segment(s) that might be affected by a set of dischargers.

Establishing the principle that trading boundaries and watershed or segment boundaries coincide ensures that the parties to a trade are affecting the same waterbody or stream/river segment. Implementing this principle protects the waterbody as a whole and guards against having adverse localized effects or specialized local problems, such as poor mixing.

The most appropriate hydrologic unit, and therefore geographic area, for trading depends on site-specific hydrogeologic conditions: water chemistry; ecological parameters; and the location, number, and types of sources. Often trading zone boundaries coincide with watershed or segment boundaries developed in TMDLs. These boundaries should be of a manageable size to ensure that assessments are reliable.

Delineation of these boundaries can vary for different pollutants, particularly those for which effects depend on biological or chemical processes that occur after the pollutant is discharged (e.g., decay rates). With such pollutants, shifting discharges from one point source to another can change the location of key downstream impacts.

The definition of a trading boundary also is affected by the governing body or management structure of the trading program. The trading boundary should prevent localized problems that could

occur if trading boundaries overlap for different trading programs or kinds of trading.

Consider, for example, a situation where point/point source trades are beneficial across three segments, but point/nonpoint source trades are beneficial in only one segment. As a result, trading area sizes might vary from program to program and might involve any number of segments.

Principle 6: Trading will generally add to existing ambient monitoring.

Availability of data is important to all parties involved in maintaining water quality. Access to data on water quality and changes that result from pollutant loads allows analysts to evaluate proposed methods of meeting water quality standards. Most of the data necessary to conduct such evaluations will need to be collected through ambient water quality monitoring. Such monitoring may be conducted by government agencies, pollutant dischargers, or other groups, using approved sample collection, analysis, and reporting methods.

Implications for Trading

An assessment of trading water quality impacts may involve water quality analysis and modeling. The data needed depend on the sophistication of the analysis, the pollutant(s) involved, and the nature of the receiving water. Three general categories of data are necessary to support trades:

- Current water quality conditions.
- Predicted effectiveness of pollution reduction options.
- Assessment of trading results.

Data describing current water quality conditions help evaluate types and levels of water quality improvements necessary to meet and maintain water quality standards. Together with data on current loadings and facility-specific information, regulatory authorities use water quality data in the TMDL and NPDES permitting processes to establish wasteload and load allocations and effluent limits that will yield in-stream pollutant concentrations that meet applicable water quality standards. Data also are needed to verify that trading obligations have been met and to build technical credibility. To evaluate the potential impact of trades on water quality, it is necessary to understand the probable effects of various pollutant load reduction options.

Predicting effectiveness involves obtaining data on factors present in the trading area that are not strictly related to water quality. Spatial (where), temporal (when), chemical (pollutant type/form), weather pattern, and geographic (e.g., slope, soil type) characteristics all can affect the level of pollution control achieved by trading. The necessary level of detail will vary depending on the complexity of the waterbody system and type of analytical techniques used.

Once trades are initiated, ongoing ambient and effluent monitoring data are needed to determine whether trades are meeting and maintaining water quality standards and whether traders are meeting applicable limits. As trading occurs, managers can conduct periodic evaluations to determine whether program design or administration adjustments are warranted.

Principle 7: Careful consideration is given to types of pollutants traded.

Different pollutants have specific chemical characteristics that interact with receiving waters and affect water quality in unique ways. A given pollutant*s effect on water quality depends on numerous factors, such as the source of discharge or the weather. Some pollutants can collect in receiving waters in relatively large quantities without causing ecological damage, whereas small quantities of other pollutants can be quite harmful. In addition, a pollutant that generates no harmful impacts in one area within a waterbody might generate harmful local effects in another area.

Implications for Trading

Selecting pollutants that are eligible for trading has implications for meeting water quality goals and avoiding unnecessary risks to ecological health. Localized effects of pollutants are a particular concern for trading programs.

Trading often changes the location in a watershed or segment where pollutant loading reductions occur. Thus, while some locations might receive smaller pollutant loads, other locations might not receive the additional reductions they would have received without trading. Analysis of such trades, including the potential impacts of spatial or temporal variations in loadings, is necessary to avoid localized violations of water quality standards. Further assurance is obtained by performing a site-specific cross check, ensuring that water quality criteria are met at the point where they apply.

Ensuring that water quality standards are attained throughout a trading area is easier for some pollutants than for others. Nutrients, for example, might be less likely to create serious localized effects. On the other hand, it could be difficult to prevent local violations of water quality standards when trades involve certain toxic pollutants.

When trading facilitates reduction of toxics, it could be valuable. The appropriateness of trading toxics, however, is dictated by the nature of the pollutants considered and site-specific conditions. For toxic pollutants that are persistent and bioaccumulative in nature, it might be inadvisable to supplement regulation of toxic pollutants with a trading option.

EPA does not currently envision a situation in which “cross-pollutant” trading could work under current regulatory conditions and technical limitations. Most (if not all) trades to date have involved the same pollutant, such as nitrogen for nitrogen or phosphorus for phosphorus. A few communities are considering trading involving different pollutants, such as nitrogen for phosphorus or nitrogen for zinc. (See Appendix B.)

Sufficient data are often unavailable to enable assessment of the impacts of different pollutants, and therefore the relative value of pollutant load reductions. Without such assessment, though, water quality managers are unable to predict the effects of trading. In the future, in cases where environmental benefits can be thoroughly demonstrated, EPA will consider the use of cross-pollutant trading.

Principle 8: Stakeholder involvement and public participation are key components of trading.

Trading brings watershed stakeholders—regulated sources, nonregulated sources,

regulatory agencies, other interested organizations, and the general public—together and engages them in a partnership to solve water quality problems. All stakeholders, including partners to a trade and waterbody beneficiaries, can benefit from their involvement in trading processes.

Trades draw on the expertise and local knowledge of stakeholders to ensure that trading projects have their support. A trading option can serve as a consensus-building exercise, leading to more cooperative, comprehensive solutions. Such solutions can provide benefits that might not have been captured in a traditional regulatory approach, such as increased identification and control of cumulative effects (e.g., habitat degradation).

Implications for Trading

The Clean Water Act or EPA regulations require public notice and comment procedures or a hearing where trades involve point sources, NPDES permits, TMDLs, and other CWA programs. State and local authorities also can implement public notice and participation procedures for proposed trades that do not involve point sources.

Stakeholder involvement and public participation in trading educate the community about the cost savings and environmental benefits obtainable through trading. They also educate those managing a trading program about concerns of the general public. Trading can build new alliances both among stakeholders and between stakeholders and the general public. These groups might have had few prior opportunities to work together, especially where watershed approaches are new or absent. Thus, the process communities go through when they consider a trading option moves them toward better management approaches and more effective environmental protection.

Communities that design and direct innovative alternatives, such as trading, for achieving environmental goals can be rewarded with greater efficiency or effectiveness than that possible under current regulatory approaches. Continued progress in achieving environmental quality and economic development will depend on greater involvement of communities in designing local solutions to local problems. Such involvement and outreach also can lead to greater involvement in water quality improvement projects beyond the scope of initial trades.